In Th Claims

Applicant is amending the claims in this patent under 37 CFR 1.173(b) and 37 CFR 1.173(d).

Amend claims 1, 6, 11, 16, and 21 as shown in this amendment.

Following is the currently pending claims with markings on separate pages with parenthetical statements that show the claim being amended, canceled, newly added, or left unchanged.

1. (Amended) An apparatus for fluorescence lifetime and spectral measurements, comprising:

a signal generator that generates the driving/reference signal, said driving/reference signal generator modulates the amplitude and/or the frequency of the driving/reference signal over time;

a signal generator that generates the mixing signal, said mixing signal generator modulates the amplitude and/or the frequency of the mixing signal over time;

an excitation signal generator that generates the excitation signal, the driving/reference signal drives said excitation signal generator;

a signal detector that detects the emitted signal;

a mixer that mixes the [emitted] mixing signal with the driving/reference signal and produces the processor reference signal;

a mixer that mixes the emitted signal with the mixing signal and produces the data signal; and

a processor that extracts the fluorescence lifetime and fluorescence spectrum of the emitted signal from the comparison of the processor reference signal with the data signal using a chemometric analysis.

2. The apparatus of claim 1 wherein the driving/reference signal and the mixing signal vary by an adjustable offset frequency.

3. The apparatus of claim 1 wherein said chemometric analysis extracts the fluorescence lifetime of the emitted signal from the phase difference between the processor reference signal and the data signal.

4. The apparatus of claim 1 wherein said chemometric analysis extracts the fluorescence spectrum of the emitted signal from the amplitude difference between the processor reference signal and the data signal.

5. The apparatus of claim 1 wherein said chemometric analysis further comprises a converging iterative solution.

6. (Amended) A system for fluorescence lifetime and spectral measurements, comprising:

means for generating the driving/reference signal, said driving/reference signal means modulates the amplitude and/or the frequency of the driving/reference signal over time;

means for generating the mixing signal, said mixing signal means modulates the amplitude and/or the frequency of the mixing signal over time;

means for generating the excitation signal, the driving/reference signal drives said excitation signal means;

means for detecting the emitted signal;

means for mixing the [emitted] <u>mixing</u> signal with the driving/reference signal to produce the processor reference signal;

means for mixing the emitted signal with the mixing signal to produce the data signal; and

a processor that extracts the fluorescence lifetime and fluorescence spectrum of the emitted signal from the comparison of the processor reference signal with the data signal using a chemometric analysis.

7. The system of claim 6 wherein the driving/reference signal and the mixing signal vary by an adjustable offset frequency.

8. The system of claim 6 wherein said chemometric analysis extracts the fluorescence lifetime of the emitted signal from the phase difference between the processor reference signal and the data signal.

9. The system of claim 6 wherein said chemometric analysis extracts the fluorescence spectrum of the emitted signal from the amplitude difference between the processor reference signal and the data signal.

10. The system of claim 6 wherein said chemometric analysis further comprises a converging iterative solution.

11. (Amended) A method for measuring the fluorescence lifetime and the fluorescence spectrum, comprising the following steps:

generating the driving/reference signal and modulating the amplitude and/or the frequency of the driving/reference signal over time;

generating the mixing signal and modulating the amplitude and/or the frequency of the mixing signal over time;

generating the excitation signal from the driving/reference signal;

detecting the emitted signal;

mixing the [emitted] mixing signal with the driving/reference signal and producing the processor reference signal;

mixing the emitted signal with the mixing signal producing the data signal; and

extracting the fluorescence lifetime and fluorescence spectrum of the emitted signal from the comparison of the processor reference signal with the data signal to measure using a chemometric analysis.

12. The method of claim 11 wherein the driving/reference signal and the mixing signal vary by an adjustable offset frequency.

13. The method of claim 11 wherein said chemometric analysis extracts the fluorescence lifetime of the emitted signal from the phase difference between the processor reference signal and the data signal.

14. The method of claim 11 wherein said chemometric analysis extracts the fluorescence spectrum of the emitted signal from the amplitude difference between the processor reference signal and the data signal.

15. The method of claim 11 wherein said chemometric analysis further comprises a converging iterative solution.

16. (Amended) A method of producing an apparatus for fluorescence lifetime and spectral measurements, comprising:

providing a signal generator that generates the driving/reference signal, said driving/reference signal generator modulates the amplitude and/or the frequency of the driving/reference signal over time;

providing a signal generator that generates the mixing signal, said mixing signal generator modulates the amplitude and/or the frequency of the mixing signal over time;

coupling an excitation signal generator that generates the excitation signal and the reference signal to said driving/reference generator;

providing a signal detector that detects the emitted signal;

coupling a first mixer to said excitation signal generator, said mixer mixes the [emitted] mixing signal with the driving/reference signal to produce the processor reference signal;

coupling a second mixer to said mixing signal generator, said mixer mixes the emitted signal with the mixing signal to produce the data signal; and

coupling a processor to said first mixer and said second mixer, said processor extracts the fluorescence lifetime and fluorescence spectrum of the emitted signal from the comparison of the processor reference signal with the data signal using a chemometric analysis.

17. The method of claim 16 wherein the driving/reference signal and the mixing signal vary by an adjustable offset frequency.

18. The method of claim 16 wherein said chemometric analysis extracts the fluorescence lifetime of the emitted signal from the phase difference between the processor reference signal and the data signal.

19. The method of claim 16 wherein said chemometric analysis extracts the fluorescence spectrum of the emitted signal from the amplitude difference between the processor reference signal and the data signal.

20. The method of claim 16 wherein said chemometric analysis further comprises a converging iterative solution.

21. (Amended) A program storage device readable by a computer, tangibly embodying a program of instructions executable by the computer to perform method steps for a method for measuring the fluorescence lifetime and the fluorescence spectrum, comprising the following method steps:

generating the driving/reference signal and modulating the amplitude and/or the frequency of the driving/reference signal over time;

generating the mixing signal and modulating the amplitude and/or the frequency of the mixing signal over time;

generating the excitation signal from the driving/reference signal;

detecting the emitted signal;

mixing the [emitted] mixing signal with the driving/reference signal and producing the processor reference signal;

mixing the emitted signal with the mixing signal producing the data signal; and

extracting the fluorescence lifetime and fluorescence spectrum of the emitted signal from the comparison of the processor reference signal with the data signal to measure using a chemometric analysis.

22. The program storage device of claim 21 wherein the driving/reference signal and the mixing signal vary by an adjustable offset frequency.

23. The program storage device of claim 21 wherein said chemometric analysis extracts the fluorescence lifetime of the emitted signal from the phase difference between the processor reference signal and the data signal.

24. The program storage device of claim 21 wherein said chemometric analysis extracts the fluorescence spectrum of the emitted signal from the amplitude difference between the processor reference signal and the data signal.

25. The program storage device of claim 21 wherein said chemometric analysis further comprises a converging iterative solution.

Status of the Claims under 37 CFR 1.173(c)

The following table summarizes the status of the claims of this application as of the date of this amendment:

Claim Number	Status
1	Pending, Amended
2	Pending
3	Pending
4	Pending
5	Pending
6	Pending, Amended
7	Pending
8	Pending
9	Pending
10	Pending
11	Pending, Amended
12	Pending
13	Pending
14	Pending
15	Pending
16	Pending, Amended
17	Pending
18	Pending
19	Pending
20	Pending
21	Pending, Amended
22	Pending
23	Pending
24	Pending
25	Pending